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**A QUALITATIVE STUDY OF SOLDIER PERCEPTIONS
OF THE RELATIVE IMPORTANCE OF MRE
PORTION SIZE AND VARIETY**

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13. ABSTRACT (Maximum 200 words) Several focus groups and interviews were conducted with 95 military subjects from Ft. Bliss, Biggs Army Airfield, and Ft. Leonard Wood during 1997 to understand how soldiers perceive Meal, Ready-to-Eat portion size and MRE variety and to begin to determine what types of tradeoffs soldiers are willing to make between these two MRE characteristics. This study was carried out as part of a larger project whose overall goal is to reduce the cost of and the waste associated with MREs. One approach to accomplishing this was to manipulate both the portion size and variety of the MRE. Based on previous data, it was hypothesized that soldiers would want greater variety in the MRE; therefore, portion sizes might be decreased. The current findings suggest something quite different. In fact, there may be two distinct consumer segments in the military: one desiring a more entree-focused MRE and one desiring a nonentree-focused MRE that contains primarily "snack-type" (e.g., sandwich) and side dish items. This study discusses these findings and, based on an interpretation of the findings, makes suggestions for potential changes in the MRE to be tested in follow-up quantitative field studies.				
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PREFACE

This report describes the results of focus groups held in support of Military Service Requirement (MSR) AAFDMN 99-3, The Impact of Ration Menu Design on Consumption and Reduced Logistic Burden. The emphasis of the focus groups was to gauge soldier perceptions concerning the relative importance of portion size versus variety in the Meal, Ready-to-Eat (MRE). The focus groups were facilitated by Richard Bell of the Product Optimization and Evaluation Team, Supporting Science and Technology Directorate, Soldier Systems Center, U.S. Army Soldier and Biological Chemical Command (SBCCOM).

A QUALITATIVE STUDY OF SOLDIER PERCEPTIONS OF THE RELATIVE IMPORTANCE OF MEAL, READY-TO-EAT PORTION SIZE AND VARIETY

Introduction

Each year millions of dollars are spent on Meal, Ready-to-Eat (MRE) items that go unused by soldiers. Previous approaches to solving this problem have focused on improving the food and on understanding and implementing cognitive strategies that may enhance consumption and acceptance of rations. The stated objective of a current Military Service Requirement (MSR) entitled "Impact of Ration Menu Design on Consumption and Reduced Logistic Burden" is to investigate reducing the cost of rations by examining the trade-offs of portion sizes of items and variety of MRE meals. Review of existing field data, survey research, and designed laboratory experiments are all being undertaken to understand trade-offs between changing portion sizes of items or changing variety of the menus. The overall goal is to reduce cost by reducing either the size of particular items or the number of items within any individual MRE menu. It is hypothesized that through this re-design, less food will be wasted, and the cost to produce, ship, and store the ration will decrease.

Early results from quantitative analysis of existing field data and of new surveys suggest that a majority of MRE users want "more variety" and "larger portion sizes" and that there are several items which are underutilized in many field environments (e.g., coffee, fruit beverage powders). Since the ultimate goal of the project is to reduce MRE costs, either through a reduction in waste or an alteration of the MRE, and it is not possible to increase both portion size and variety to achieve this objective, there was a need to do a more in-depth examination of the trade-offs between these two variables. In addition, by taking an in-depth, qualitative approach to this research, we could begin

to understand how military personnel talk about variety and what they mean by variety, and determine what could be extracted from them which would either support some of the quantitative data or suggest areas for further investigation. In accordance with these needs, a series of qualitative approaches (one-on-one and small group interviews and focus groups) were conducted in order to address the following research questions:

Primary Questions:

- What do soldiers mean when they say they "want more variety"?
- What do soldiers say they want in portion sizes of MRE components?
- What are soldiers' "stated trade-offs" of portion size and variety?

Secondary Questions:

- Does a meal-specific MRE (i.e., for lunch, dinner) have an impact on perceptions of variety?
- How do non-food items fit into the portion size/variety trade-off equation?

Prior to this study, the research team had hypothesized about soldiers' preferences in terms of portion size and variety, based on previous quantitative data and a general understanding of food habits. These hypotheses included: 1) soldiers will want a greater variety of choices among MRE meals; 2) there may still be a need for meal-specific items in the MRE (i.e., breakfast items, which are currently not available); 3) soldiers will want larger portion sizes of main entrees; 4) if forced to make a choice between portion size and variety, soldiers will state that variety is the critical variable.

In this report we have tried to include a full description of the findings; therefore the report is somewhat lengthy. A summary of the data, interpretations, and recommendations based on the findings may be found in the last three sections, beginning on page 14.

Methods

Technique

Several types of qualitative methods have been used in research studies (e.g., interviews, participatory observation, focus groups) and several paradigmatic approaches are available (e.g., constructivism, critical theory, positivism). In general, methods to be used grow out of the research questions that are asked and the type of information needed. In this study, although there were several *a priori* hypotheses delineated, there were many unknowns in regard to how MRE users would talk about the trade-offs of portion size and variety.

For this study, a technique known as Grounded Theory (Glaser and Strauss, 1967) was chosen. The difference between this technique and traditional approaches to qualitative research is that conventional research draws on the logic of verification of hypotheses, while grounded theory research draws on the logic of discovery of new ideas as the data are collected. Hence, though some hypotheses were delineated when an initial moderator's guide was developed, the data from subject interviews and focus groups generated changes in the guide for each subsequent interview or group. A copy of the moderator's guide can be found in the Appendix.

Sample

Ninety-five subjects were drawn from a set of convenience samples from three military installations: Fort Bliss in El Paso, Texas (28-29 March 1997), Biggs Army Airfield in El Paso, Texas (31 March - 2 April 1997), and Fort Leonard Wood in Fort Leonard Wood, Missouri (4 April 1997). Table 1 lists the type of qualitative methods used at each site and the number of subjects recruited for each method.

Table 1. Site, method, number of times method used, and number and gender of subjects.

Study Site	Qualitative Method	Number	n (F, M)
Ft. Bliss	One-on-one interviews	6	6 (0, 6)
	Small group interviews (n=2-3)	7	17 (0, 17)
	Focus groups (n=7)	2	14 (0, 14)
Biggs Army Airfield	One-on-one interviews	11	11 (5, 6)
	Small group interviews (n=2-3)	12	28 (12, 16)
Ft. Leonard Wood	Focus groups (n=9-10)	2	19 (8, 11)

All of the soldiers at Ft. Bliss were military police with the 978-MP and Center-MP units. All held ranks of E-5 or E-6. Subjects ranged in age from 23 to 27, and most had extensive experience in the field, in combat situations, and with MREs. The latest version to which any subject claimed to be exposed, determined by the items named by subjects, was MRE XIV (1994 procurement date).

The subjects from Biggs Army Airfield were students at the Sergeants Major Academy. All held ranks of E-8 or E-9. These subjects ranged in age from 29 to 45. Although this group of soldiers is older and less likely to be the current and future consumers of MREs, most had extensive and wide-ranging experience in the field, in combat situations, and with MREs, and came from several different MOS designators, including communications, artillery, engineering, medical, and infantry. The breadth of experience, willingness to talk about the subject, and ability to articulate their own impressions, as well as those of their troops; made this subject pool an invaluable resource. Because of their ages, there was concern that the experiences of these subjects would be limited to C-rations and very early versions of the MRE. However, the items they named reflected the fact that they had been exposed to MRE XIV (1994 procurement date) and MRE XV (1995 procurement date).

The two focus groups conducted at Ft. Leonard Wood were with soldiers who were primarily engineers. Ranks of these subjects were E-7, E-8, or E-9. Subjects ranged in age from 24 to 30, and most had extensive experience in the field, in combat situations, and with MREs. The latest version to which any subject was exposed was MRE XIII (1993 procurement date).

Data Collection, Processing and Analysis

The one-on-one interviews, small group interviews and focus groups conducted at Ft. Bliss took place in a park on the installation grounds on each of the two days, 28 and 29 March. The eleven one-on-one interviews held at the Sergeants Major Academy took place in the Health Communications Office over the course of two four-hour periods on the mornings of 31 March and 2 April; the small group interviews took place in an auditorium on 1 April while subjects were waiting to have their blood drawn for a study being conducted by the Army Institute of Environmental Medicine (ARIEM). The two focus groups at Fort Leonard Wood took place in the morning of 4 April in the lobby of a theater, which subjects were leaving after completing a survey conducted by the Soldier and Biological Chemical Command (SBCCOM) Operational Forces Interface Group (OFIG).

One-on-one interviews took approximately 20 to 30 minutes, with several taking a shorter period of time (as little as fifteen minutes for two), and others taking a longer period of time (as much as 40 minutes for three). The small group interviews also took approximately 25 to 35 minutes to conduct. The focus groups lasted the longest, averaging about 45 minutes in length.

The moderator, who was trained in qualitative data collection techniques and analysis, led the discussion using the moderator guide for the early interviews. Based on the data emerging from each interview or group, this guide was altered for each subsequent group, until eventually the questions and content became more focused, and more in-depth information about several key concepts was elicited.

The small groups and focus groups were audio-recorded by the moderator. Session recordings were carefully examined, and the responses were used to guide the next session's questions. This qualitative data was also used to generate ideas for hypotheses about the trade-offs between portion size and variety, as well as to hypothesize about the MRE eating patterns and characteristics of the soldier population.

Analysis was performed by reviewing the data for examples that supported or refuted the *a priori* hypotheses. A qualitative path analysis using the basic tenets of Grounded Theory was used to establish a cohesive summary of the data. In order to gauge how subjects responded to the issues covered in this study, summary statistics are also reported herein. These numbers were derived by taking a frequency count of the interviewees and group members who responded in a particular manner. For example, a table in the Results section will describe the percentage of subjects who chose an item for removal from the MRE, after being presented with a hypothetical question that asked them to remove one item from the MRE in an effort to reduce its size.

Results

Results will be described within the context of each of the research questions. Where appropriate, direct quotes from subjects will be cited, as will frequency counts and summaries of qualitative discussions.

Perceptions of and Desire for Variety

A primary research objective in this study was to understand what soldiers mean when, in quantitative studies, they claim to "want more variety." The responses from subjects in the current study were not in support of this finding. In general, nearly all subjects defined MRE variety in terms of the items available over the specific period of time a soldier consumed MREs continuously. If MREs were to be used only once for one day, then variety related to the number and variation of items in that one meal. If MREs were to be used as one meal per day for several days, then variety related to the number and variation of items in the meals to be consumed over that several day period.

Surprisingly, nearly every subject claimed that when it came to MREs "variety of choices across different MRE menus is not critical." In fact, it was fairly unimportant, unless MREs "...were to be the only source of food over more than a week." Soldiers were quick to state that they would be "...satisfied with a limited number of meal choices, provided that there were at least a few of them they were willing to eat." Several subjects stated that as long as the items were "tolerable" (in terms of acceptability), they wouldn't care if they got the same items for many days in a row.

There was an interesting split in terms of describing the specific variety within one MRE. There appeared to be two distinct types of responses to the issue of "amount of variety": about one-third of the subjects accepted the number of items available in a single MRE, and they even stated that "...fewer would be better, especially if on maneuvers." The other two-thirds of subjects claimed to want more side dishes and snack items within a single MRE, while preferring to receive a smaller entree or no entree at all. In fact, of these subjects, nearly half stated they would "...prefer it if there were no entree or a very small entree."

When asked to consider those items that subjects would be willing to part with if they had to reduce the amount of variety available, certain consistencies were found. A

majority of subjects was willing to exclude several items, including matches, the fruit beverages, coffee, sugar and cream. Table 2 lists the frequency of each item listed by subjects. Not included in the table are those items that are no longer part of the MRE. For example, the Omelet and the Escalloped Potatoes with Ham MRE entrée was mentioned frequently. Subjects were informed these items were no longer a part of the ration. When asked to explain why they would remove certain foods, the most common reasons given were that the quality of these items was not considered to be very good, and that "...most of us bring our own (items) into the field." Even in combat situations, subjects stated that they tended to bring into the field those items that are also available to them in the ration, such as coffee, tea, cocoa, matches, and toilet paper. Those subjects who bring their own coffee or tea also bring their own cream or sugar, or whatever they prefer to add to their beverage. The few people (n=3) who wanted cream and sugar did not necessarily use these items for the coffee; instead, they regularly added them to the cocoa in order to increase its sweetness and caloric content.

Table 2. Frequency of the MRE items subjects stated they *would* remove if they were to reduce the number of items in the MRE (total n=95) *

Item	No. of Mentions	% of Subjects
Matches	78	82.1%
Coffee	63	66.3%
Sugar	69	72.6%
Cream	67	70.5%
Fruit Flavored Beverage (all flavors)	65	68.4%
Tea	52	54.7%
Cocoa	47	49.5%
Toilet Paper	42	44.2%
Tabasco Sauce	37	38.9%
Charms® Candy	31	32.6%

* Subjects could state more than one item.

The same explanation holds true for Tabasco sauce. Although subjects are, in general, satisfied with the inclusion of something to add spice to their food, more than half of the subjects claimed they bring their own condiments into the field because they prefer Worcestershire sauce, soy sauce, mustard, ketchup, honey or maple syrup to add to the food. Those subjects who relied solely on the MRE believed that the inclusion of Tabasco sauce forced them "to use Tabasco sauce for spicing, or use nothing at all."

Subjects were also asked to list any items they would never remove if the ration were to be reduced in size. Table 3 lists the frequency with which these items were listed.

Table 3. Frequency of the MRE items subjects stated they would *never* remove if they were to reduce the number of items in the MRE (total n=95) *

Item	No. of Mentions	% of Subjects
Pound Cake	91	95.8%
Gum **	77	81.1%
All Snacks ***	64	67.4%
Wet Towelette	59	62.1%
Cream	19	20.0%
Sugar	17	17.9%
Coffee	14	14.7%
Tabasco Sauce	4	4.2%

- * Subjects could state more than one item.
- ** Many subjects stated they wanted more than two small pieces. Two pieces were described as being a "tease."
- *** Many subjects stated they wanted either larger snacks or more snacks in each meal. Having small snacks was also described as being a "tease."

Portion Size

Another issue to be addressed in this study was to understand what soldiers want in portion sizes of MRE components.

As was found with variety, there appear to be two distinct types of responses to the issue of "portion size." The same subjects who accepted the number of items in an MRE, or who wanted fewer items, also expressed an interest in wanting to have larger portion sizes, especially of the entree. These subjects tended to be males of large stature. A few women (n=3) also asked for larger entrée portions, but these women stated that they would want this only under extreme conditions, when they would be burning up a large number of calories per day, and only when the MRE was being used over a period of several days.

The same subjects who focused on the side dishes and snacks also wanted these items to be larger, and they expressed an interest in smaller entrees. There was also a high proportion of subjects who complained that the total fat content of the MRE was "too high." These subjects were primarily males and females who were eating only one MRE per day, or were eating three MREs per day for only a few days. About a quarter of these subjects were males and females who claimed to be concerned about their body weight and who regarded time in the field "as an opportunity to keep their weight down." Because of this, they would be less likely to eat more than a few MRE snacks or side dishes, using them "mainly for an energy boost" when in the field. These subjects also suggested that if entrees were to be smaller, they might want to compensate for this by having larger snacks, stating that they "...would eat the snack items over several snack breaks during the day, rather than stopping to eat an entire meal." The perception of snacks being too small was seen in both segments; nearly all of the subjects complained that many of the snacks were "so small...they are just a tease."

In general, subjects stated that they did not require the meal to "taste great," but preferred it to be "merely tolerable," and wanted it to provide them with "a feeling of

being full," so they could "concentrate on their mission." Several of their favorite MRE items were those that were not the best-tasting, but were the most filling. These included the cracker (especially when eaten with cheese), the shortbread bar and the oatmeal cookie bar. One subject in each of two of the focus groups made similar comments: "Don't make it five-star restaurant food; give us a palatable way to make us not feel hungry...but do make it palatable."

Meal-Specific MREs

NRDEC has previously attempted to include a breakfast menu in the MRE; in fact, MRE XVIII concept menus do contain some breakfast items. This issue remains an important one, since previous research on foods considered to be inappropriate for breakfast suggests that these foods will be less acceptable and consumed less often (Birch, Billman and Richards, 1984; Kramer, Rock and Engell, 1992). Therefore, the current study elicited comments about breakfast items and the possible impact of breakfast items on perceptions of MRE variety.

Contrary to the hypothesis that breakfast items would be desired, nearly all subjects stated that breakfast items were of "little or no concern." In general, soldiers were satisfied with the meal choices, as long as they "at least tolerated the taste of the meal" they got in their MRE at breakfast time. Getting a meal appropriate for breakfast was viewed as a luxury, rather than a necessity. Of more concern was the challenge of being able to heat meals that required heating, a problem that most soldiers stated was solved by the Flameless Ration Heater (FRH). However, several subjects noted that they frequently did not have the time to heat an entree that required heating, even though they had the Flameless Ration Heater.

Several subjects also described ways they were able to use the currently available MRE components to create their own breakfast items. Not only do the subjects describe interesting approaches, but they also suggest items which could be developed for inclusion in future MREs.

For example, many subjects bring Pop-Tarts® into the field and use them as a breakfast item. When one soldier mentioned this fact on the first day of the study, every other member of his group agreed that they too do this; and when the moderator brought up the idea to subsequent groups, everyone agreed it would be advantageous to have this type of item in the MRE. (It should be noted that Kellogg's Apple Cinnamon Toaster Pastry® began to be included in MRE XVIII.) Another interesting example came from a soldier who would steam the pouch bread, then pour on some maple syrup he would bring with him, creating his own version of French Toast. Using a similar concept, another soldier added her own small package of icing to a steamed pouch bread, creating a version of a glazed donut.

Though meal appropriateness was described as being of little concern in this study, appropriate temperature of foods was considered critical. Because previous field test data have suggested that once an MRE item is opened it is consumed, the moderator questioned how this potential inappropriate temperature influenced soldiers' consumption of these items. Every single group and more than half of the individual interviewees claimed that they would not even open a ration if they knew it would not taste good at ambient temperature. According to many, "heating entrees remains a problem," even though subjects were aware of and had experience with the Flameless Ration Heater. Subjects stated they normally did not have time and often did not have the space or facility to comfortably use the FRH. Though the items may taste acceptable when heated, their acceptability drops when they are eaten at ambient temperature.

Non-Food Items

One final issue covered in this qualitative study was that of understanding how non-food items fit into soldiers' trade-offs of portion size and variety. Several of these items have been mentioned earlier in this report: matches, toilet paper, and the wet towelette. Through the series of interviews and focus groups, it was evident that these

items are not specifically involved in the trade-off of portion size and variety, but the exclusion or inclusion of these items in the MRE was frequently discussed by soldiers. A description of these findings for each item follows.

The matches are used less often than they may have been several years ago. Although smoking prevalence among soldiers may be less than it was a decade ago, many soldiers still smoke cigarettes. However, those subjects who were smokers (n=16) stated that they did not use the matches provided, but instead used a lighter or their own matches. Having to open the accessory packet to get what they described as "poor quality matches...was a waste of time." Those subjects who claimed to use the matches at all (n=4) used them to light a Sterno® they would bring into the field, or to provide light in an emergency.

The subject of the toilet paper also elicited some spirited discussion. In general, few people are happy with the toilet paper in the MRE, and most soldiers take their own supply into the field. Many soldiers claimed that they just toss the toilet paper into a big box with other MRE toilet paper before embarking on their mission. This bigger box can then be used by anyone interested in more than just one package. Most of the time, persons selecting toilet paper from this box did so to replenish their own personal supply. Only one person out of the 95 people involved in the study thought that the toilet paper was a worthwhile item to keep in the ration.

The wet towelette was the only well received non-food item. In general, about half of the subjects believed it was an invaluable commodity; the other half held no strong feelings about the item's inclusion.

Although salt is considered to be a food item, several comments about the salt may provide interesting insights into perceptions of the ration. Most soldiers want to add flavor to their entree items; in fact, few people claimed to eat any entree without adding some condiment. But the responses to the condiment question were polarizing in nature: While most soldiers wish to retain some sort of seasoning in the MREs, they

are divided over whether it should be salt, pepper, or both. One subject expressed preference for a pepper packet, similar to the salt packet, rather than Tabasco. Half of the subjects who mentioned the use of pepper also suggested inclusion of a packet that combined both salt and pepper. Though this idea was appealing to many, others believed there were some things to which one might want to add salt only.

After hearing about the underuse of these accessory items, the moderator began making suggestions about solutions to this problem. One idea which many soldiers thought would be very useful was to remove the individual accessory packets from each MRE and, instead, to pack into each case one extra large accessory packet from which soldiers could take what they wanted. Besides lightening the weight of each meal for the soldier, one large packet would reduce the cost of producing each meal, and there would be less waste of individual products.

Summary of Findings

There were several primary and secondary research questions posed when this study began. What follows is a summary of findings based on each of the research questions:

1) What do soldiers mean when they say they "want more variety"? -- Data from previous quantitative questionnaire studies suggested that the majority of soldiers wanted more variety. This study has revealed that their definition of variety may not relate to variety as we might define it for the MRE. When directly asked and given an opportunity to talk about it, soldiers indicated that variety is not a critical issue unless MREs are to be the sole source of food over many days. Included in the issue of variety would be those items subjects were willing to part with if they had to give up something. Though several items were individually listed, the consistently mentioned

items were coffee, sugar, cream, tea, and the fruit-flavored beverage mixes. A more complete list can be found in Table 2 on page 8.

2) What do soldiers want in portion sizes of MRE components? -- Data from quantitative studies suggested that the majority of soldiers wanted larger portion sizes of some items. This study has revealed that the desire for larger portion sizes is dependent upon the item in question and upon the type of consumer the soldier is. About a third of the subjects wanted larger entrees; the remaining two-thirds of the subjects wanted smaller entrees and larger snack items and side dishes. This finding led the moderator to hypothesize that within the military consumer population there may be two distinct sensory segments: a segment more interested in the entrée, and a segment more interested in the snacks and side dishes.

3) What are soldiers' "stated trade-offs" of portion size and variety? -- The research team had hypothesized that variety would be more crucial than portion size and that consumers would be willing to sacrifice portion size for greater variety in the MRE. The data from this study do not support this hypothesis; in fact, the more critical issue was portion size. Regardless of whether subjects are more interested in the entrée or in the snacks and side dishes, they would accept less variety within a single MRE if they could have larger portion sizes. For the segment more interested in the entrée, the larger portion size would apply to all items, but especially to the entree; for the segment more interested in the snacks and side dishes, the larger portion sizes would apply to those items, with this segment desiring smaller entree portions. For all subjects, small snack items were considered a "tease."

4) What impact does MRE meal specificity (or lack of it) have on perceptions of variety? -- Prior to this study, there was concern that there were no breakfast items included in the MRE. Previously developed breakfast items were among the more poorly accepted items, and more acceptable ones were difficult or too expensive to produce. The data from this study suggest that meal specificity is not considered to be

a great concern; but if breakfast items could be included, this would be a luxury, not a necessity. Many soldiers have found ways of preparing the current items so as to mimic breakfast items. For examples of these, see the section of this report entitled "Meal-Specific MREs," beginning on page 11. Though meal appropriateness was described as being of little concern in this study, appropriate temperature of foods was considered critical. Heating entrees remains a problem, even though subjects were aware of and had experience with the Flameless Ration Heater (FRH). Subjects stated that they normally did not have time and often did not have the space or facility to comfortably use the FRH.

5) How do non-food items fit into the portion size/variety trade-off equation? - According to previous quantitative data, matches and toilet paper are two fairly unused items. The findings from this study support this conclusion. The wet towelette was one of the only non-food items that was reported to be a useful and frequently used item. However, non-food items did not fit into the concept of a trade-off between portion size and variety.

Interpretation of Findings

Trade-Offs of Portion Size and Variety in a "One-Size-Fits-All" MRE

The interpretation of the data suggests that there may indeed be two distinct consumer segments among the military. The two segments are defined as follows: those soldiers who focus on characteristics of the entrée (to be called Entrée-Focused Consumers") and those who focus on characteristics of the more carbohydrate-dense, easily eaten out-of-hand snack and side dish items (to be called "Non-Entree-Focused Consumers"). Those who are entrée-focused would like to see larger portion sizes of entrees, sides, and snacks, and are willing to accept fewer items in each MRE in order to accommodate these larger portions. Those who are non-entrée-focused and eat-out-of-

hand-focused would like to see smaller sizes of the entrée and larger sizes of the sides and snacks. In fact, they would be willing to eliminate the entrée completely if they could have more food items that they could carry in their pockets or their rucks, in order to eat as their energy needs dictated throughout the day.

Two other interesting defining differences between these two segments were also noted. The Entrée-Focused consumers reported that they tend to eat the entrée first, then immediately consume the sides and snacks, eating all items in one sitting when possible. Non-Entree-Focused consumers related how they tend to eat the snacks and side dishes first, and usually not all at once, employing more of a grazing concept – and then may or may not eat the entrée at all. In instances whereby the MRE was used for only one meal out of three for the day, most subjects stated that they usually did not eat the entrée.

This consumer segmentation was also observed when considering the amount of total food available in a single MRE. The Entree-Focused consumers tended to be bigger eaters and could eat all of an MRE if it were to be one of three meals in the day; but only about 10% of these soldiers claimed to be able to finish three MREs if the latter were to be the only source of food for an entire day. Thus, very few soldiers are capable of consuming the approximately 3600 calories provided in three MREs per day. This finding suggests that reducing the caloric content of each MRE would likely increase the proportion of food consumed and would decrease the amount wasted. The Non-Entree-Focused segment tended to eat fewer calories than did the Entree-Focused segment, and they complained about having to carry around the entire MRE all day, knowing they would not eat it all. Many of them remove unwanted items from the MRE before heading out for their daily mission.

SBCCOM has traditionally provided a single field ration for most field environments that must satisfy all consumers. If we consider the findings of this qualitative study, it is obvious we can only partially please the Entrée-Focused segment,

and we can only partially please the Non-Entree-Focused segment. We will be able to totally please very few consumers. However, there are potential strategies that could be recommended in order to please a majority of consumers and still achieve a cost reduction. These are described briefly in the final Recommendations section of this report.

The MRE, as it is currently packaged and delivered, aims to be everything to everyone. Regardless of a soldiers' mission, this is the meal that will be provided. Hence, if an operational ration is to be provided only as a snack, or as a lunch, or as a breakfast, the MRE is the only option; if an operational ration is to be provided as the sole source of food over an entire day or over several days, the MRE is the only option. Logically, no food company would ever assume that any one food, meal, or set of meals could serve all of these functions. Because we ask military personnel to accept this one ration for all situations, we cannot expect it to be universally accepted. Because there are many situations when an MRE meal is inappropriate, we should expect to continually hear complaints about the MRE from military personnel. And conversely, because there are many situations when an MRE meal is appropriate, we should expect to hear a number of positive statements about the MRE from military personnel.

One final interpretation of the data is the soldiers' definition of the word *variety*. In this context, variety seems to relate more to the number of different types of items in one MRE, rather than to choice across several MREs. In the food research community, as well as in culinary arts, marketing, nutrition, and psychology, the term *variety* has been used often. We have always assumed its meaning. This study suggests that a researcher's or a dietitian's or a restaurateur's definition of variety may be different. This is an area of research that has not been explored. Until it is, we must be cautious when interpreting data from subjects who claim to want "more variety."

Recommendations

The ultimate goal of this MSR project is to reduce MRE cost by redesigning the MRE, based on relationship between portion size and variety. This qualitative study does provide some potential ways of accomplishing this goal. However, further research will be necessary to corroborate the findings.

As described earlier, we have found that as much as 40% of the MRE may go uneaten. If there truly are two distinct consumer segments, then it is possible that the waste we have seen may be a function of the two sensory segments: The Entree-Focused segment may be eating more of the entrees, and wasting some of the side dishes and snacks; while the Non-Entree-Focused segment may be eating more of the snacks and side dishes, but not eating the entrees. We are currently examining our existing field study database to determine if indeed this segmentation is evident. Changing the MRE to meet the needs of one of these segments would certainly encourage that particular segment to consume more of the ration, but there would still be dissatisfaction and waste among consumers in the other segment.

To resolve this problem there are a few strategies that could be considered. This is not to say that these recommendations should be adopted. However, it is important to acknowledge the limitations of the current ration system and to realize that there are creative ways to address these limitations, and these, as well as others, should be considered for future research.

One solution to the problem, though it requires an initial investment, is to consider an "MRE Basic," based on the desires of the Non-Entree-Focused segment, and then to have an "MRE Supplement," which adds the large entrée to the MRE Basic, thus addressing the desires of the Entrée-Focused segment.

If the initial investment in this novel ration concept is unappealing or not possible, then certain strategies must be implemented within the "one-size-fits-all" MRE

concept. In particular, this study suggests that increasing the portion sizes of snacks, while maintaining or reducing the number of snacks in each MRE, may be a realistic way to satisfy more soldiers, reduce waste, and reduce packaging costs. There are nutritional considerations for each meal that would need to be worked out, but, through fortification, this may be possible.

Another approach to cost-savings suggested by this research is through the manipulation of the smaller accessory items. One key strategy could be to replace the Tabasco sauce with a dried pepper packet. The inclusion of a pepper packet in place of Tabasco sauce in many of the MRE menus would represent a significant cost reduction, considering that the Tabasco sauce costs more than 12.5¢ apiece (1997 unit price). Assuming a packet of pepper costs less than one penny, that substitution would result in an 11.5¢ savings per meal—nearly a 4% saving in material costs alone. Since many soldiers bring their own condiment to the field and others would choose a condiment other than Tabasco, this replacement could produce a significant saving. Dried pepper was previously tested as a possible inclusion in the MRE, but was rejected due to potential storage instability; however, considering the new irradiated spices available, this storage problem should no longer be a deterrent.

The use of MRE coffee and tea is very low, and those who do drink them tend to bring their own supply into the field. Quantitative data appear to support this finding, and it is possible that removal of these items and their accompanying cream and sugar would decrease the costs of packaging, assembling and shipping.

A simple, though very minimal, cost savings could be effected by removing the matches and toilet paper from the MRE, considering that personal supplies of both of these items are usually brought into the field, and the MRE versions are used only in emergencies.

A significant saving in assembly could be achieved by supplying only one large accessory packet for each case of MREs. Soldiers would then take from this large packet

only the items they needed. One key advantage of this strategy is the fact that the same quantity of items is still being provided in each case, but the items are not individually placed into each MRE meal.

A drastic solution, and one which is not likely to be adopted, would be to consider a two-MRE system: one system which caters to the Entrée-Focused segment and one system which caters to the Non-Entree-Focused segment. Research could be conducted to estimate the proportion of consumers in each of these segments, and logistics would then determine how to change the way in which MRE cases are packed in order to reflect this proportion. Although no single case will always match the proportion of segments within a particular unit, we may be able to better meet the desires of more consumers. The result might be greater MRE consumption, less waste of items, and, considering the larger portion sizes and decrease in the total number of items, a possible reduction in per-meal packaging. It is acknowledged that a two-ration system is not a strategy the military is likely to--nor necessarily should--adopt, but the possibility does exist.

All of the aforementioned strategies would require further research and investigation if they were to be considered. In addition, it is recommended that further designed experiments and surveys be carried out to corroborate the findings of this study and to test other hypotheses and research ideas generated by this study.

Final Comments

Certain process issues related to this study deserve some mention here. Focus groups and other forms of qualitative research have been used sporadically at SBCCOM, primarily when conducting research for food product development. Most of our research findings come from surveys or experiments, and we tend to rely heavily on data from these latter two approaches to drive product development and technology

and to formulate hypotheses about what soldiers want. The findings from this study suggest that there may be aspects of projects that cannot be completely understood without qualitative support. In this study, 76 soldiers provided input from El Paso, and 19 soldiers provided input from Missouri -- a total of 95 subjects. This is a substantial number of subjects, even for some quantitative studies; and it is an extensive number for a qualitative study. The data are useful not only for generating some testable hypotheses which will be researched in the quantitative phases of this MSR, but also for providing some general understanding about the food habits of soldiers. We acknowledge the presence of bias in this type of qualitative research and suggest that these findings be confirmed in further quantitative studies. These are currently underway. It is recommended that qualitative research continue to support not only this project but future SBCCOM projects as well, including projects for developing non-food products.

Mention should also be made of the members of the staff at the Sergeants Major Academy at Biggs Army Airfield, who were extremely cooperative and supportive of this work effort. They have offered their facility to SBCCOM for future data collection projects of this nature. Should there be such a need, it is recommended that this site be considered, due to the ease of accessing subjects, as well as to the breadth of experience of the students at the Academy. The Soldier and Biological Chemical Command owes its thanks to the personnel at this and other facilities who provided support.

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Appendix

Focus Group Moderator Guide

I. Introduction

- A. Personal introduction.
- B. Experience with MREs; latest version to which subject exposed.

II. Good MREs: Items and Combinations

- A. Best single item.
- B. Best overall MRE meal.
- C. What are the important components; what do you eat most/first?

III. Portion Size

- A. Importance of the amount of food in the MRE.
- B. Importance of the amount of each meal component.
- C. Which meal component should have the most food, the least?
- D. Is the total amount of food in an MRE adequate?
 - 1. Which component would you want more of?
 - 2. Which component would you want less of?
 - 3. If reducing size of MRE, what component would you remove?
 - 4. If reducing size of MRE, what component would you fight to keep?

IV. Variety

- A. Importance of variety in each MRE.
- B. Importance of having variety for any one component (eg, >1 side dish, etc).
- C. The need for meal-specific MREs.

V. Tradeoffs of Portion Size and Variety

- A. Would you rather have larger portions or more variety in each MRE?
 - 1. For each component? or for the overall MRE?
 - 2. Does this differ by the meal offered, or applicable to all MRE meals?
 - 3. Does context of situation effect trade-off decisions?